WIFI-RS232

User Manual（v1.5）

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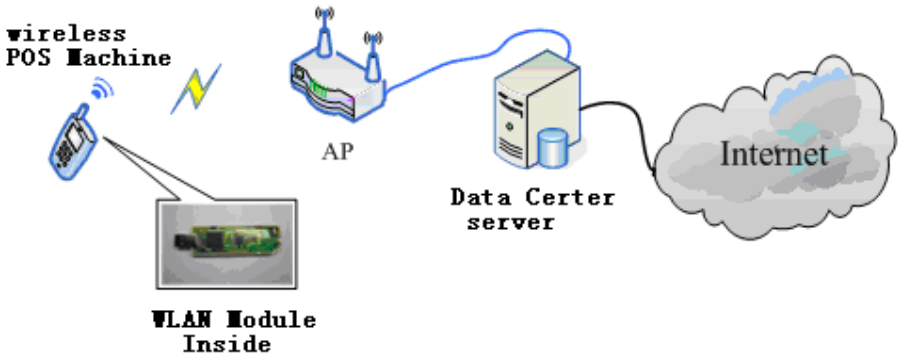
1. Overview

1.1. Main Function

- ✧ Support for UART data serial, four baud rate options: 19200 / 38400 / 57600 / 115200bps.
- ✧ Wireless data rates support the 802.11b Standard, the maximum rate is 11Mbps.
- ✧ Integrate the functions of 802.11 MAC protocol Softwares.
  - ■ Support for the STA appliances in the Infrastructure Network.
  - ■ Support for the OPEN/WEP mode authentication.
  - ■ Support for the wep64/wep128/ccmp/wpi data encryption transmission in the shared key mode
- ✧ Support for the automatic networking mode and manual networking mode.
  - ■ In the automatic networking mode，the module can automatically scan the target network, and automatically connect when disconnection.
  - ■ In the manual networking mode，operation of connect and disconnect is touched off by order，this supports a flexible control space.
- ✧ Suppport the network data transmission in RAW/UDP/TCP format.
- ✧ Suppport seven groups of the basic parameters set,and can connect to seven target networks the most.
- ✧ Suppport to Config the parameters through user serial.
- ✧ Suppport to upgrate the fireware on line by the internet.

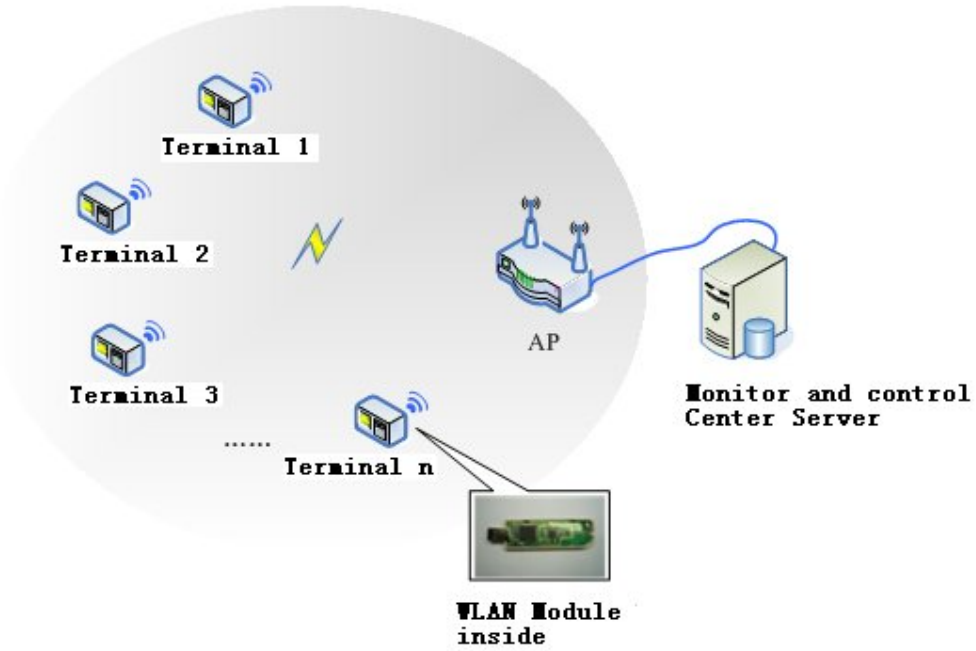
1.2. Typical Applications

1.2.1. Wireless POS Machine



In a Wireless Bus System based on the WLAN technic,carheld or handheld POS machine in each bus equips with a WLAN module based on UART serial,and AP is fixed in the Bus Terminus.When bus reachs in the terminus,wireless POS machine always does the indentification automaticly,then connects to the AP,and Operational Data in POS mechines is uploaded to Data Center Server in Bus Terminus through AP.

1.2.2. Wirelsee Monitoring and Control System

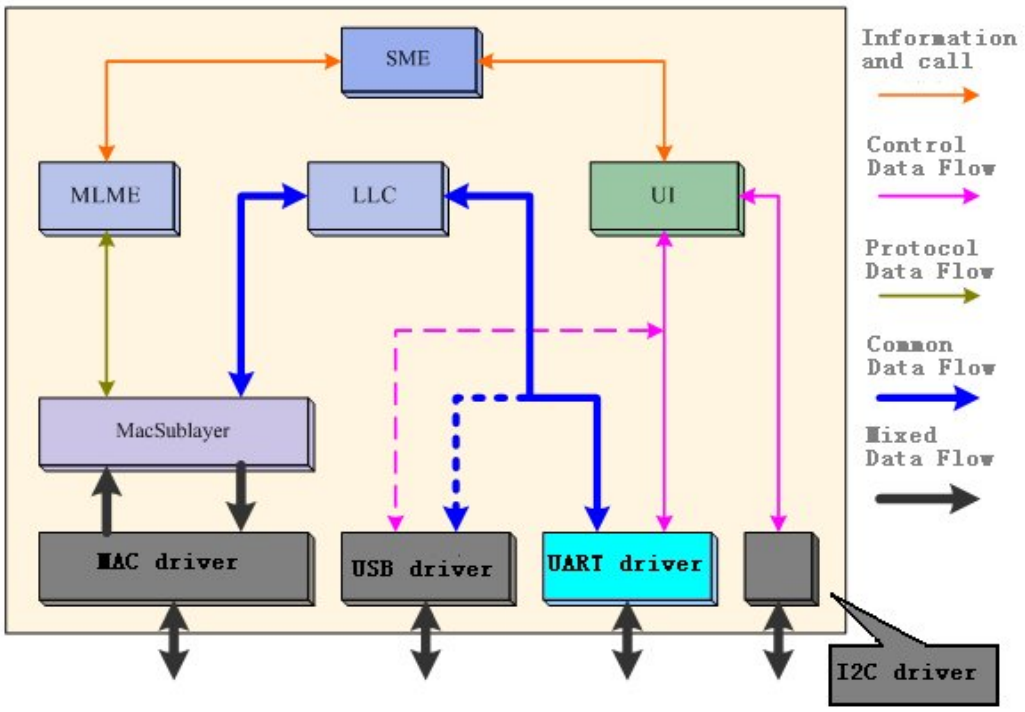


Serial devices networking （TCP/IP） has been a trendy of Industrial-site

networking,but Field wiring and the following construction, transformation cost often become a bottleneck of serial devices networking.WLAN modules embed in these Monitoring and Control Terminals ,which support serial ,not only can absolves the difficulty of wiring,but also reduces the construction cost,and it especially adapts to the devices about Industrial Environment and Factory Automation Systems,Site Monitoring System and etc.

2. Working Principle

2.1. Block Diagram



2.2. Parameter management

WLAN module supports configuration parameters which can be modified,these parameters are used to control the working mode of all the module.configuration parameter is divided into two types:system parameter and network parameter.

- System Parameter

It's the parameter setting that used to control the work mode of the module,it include:

- **Networking Mode**

  WLAN module supports two types mode:automatic networking and manualnetworking.

- **Transparent Transfer Mode**

  WLAN module supports transparent transfer mode at serials, In need of special note is that when it's in the automatic networking and uses UDP protocol in Link Layer at the same time,this mode can just be effective.

- **TCP Monitoring Mode**

  WLAN module supports the use of TCP listening mode when TCP protocol is used in Link Layer, after this mode is used ,the WLAN module can be used as a TCP server, waiting for client's connection requests.

- **Baud Rate of Serial**

  WLAN module supports four kinds of baud rate:19200、38400、57600、115200.

- **Device Physical Address**

  It's the MAC address of WLAN module.

- **Network Parameter**

It indicates the parameter that connecting to the target network needs to set,this module supports to set seven target networks,so users can set seven groups of network parameter.

Each group of network parameter include:

- **BSSID**

  The BSSID of target network，Its value is the MAC address of the AP used in target network.Each AP owns their only and not repeated MAC address,then this module uses BSSID to be the mark of different network.

- **Channel**

  It indicates the channel of the target network.This module supports Channel 1~14.

- **SSID**

  It indicates the SSID used by the target network.

- **Encryption Type**

It indicates the encryption type used by the target network,the encryption types this module supports include Non-encrypted,WEP,CCMP,WPI.

- **Key**

  It indicates the key used by the target network. According to different types of encryption, key is not the same format.

- **Data format of the Link Layer**

  This module supports three data formats:RAW,UDP,TCP.

- **Physical Address of the Server**

  It indicates the MAC address of the Data Center Server(only used in RAW format).

- **IP Address of the Device**

  It indicates WLAN module its own IP address(only used in UDP/TCP format) .

- **IP Address of the Server**

  It indicates the IP address of the Data Center Server (only used in UDP/TCP format).

- **Service Port**

  It indicates the server port number (only used in UDP/TCP format).

2.3. Connection Model

WLAN module supports automatic and manual this two modes for users to choose.It should be regarded that,in the 1.3 and previous versions, when the WLAN module is set to TCP Link Layer approach, the process of networking automatically includes the process of networking with the TCP server.

2.3.1. Automatic Networking

In automatic Networking mode, without any user intervention, WLAN module automatically scan and connect to the network after the power-on reset.

If a situation occurred as the following, WLAN module will automatically re-connect:

1、Connection is failed；

2、Network is disconnected；

3、The target network is rescanned.

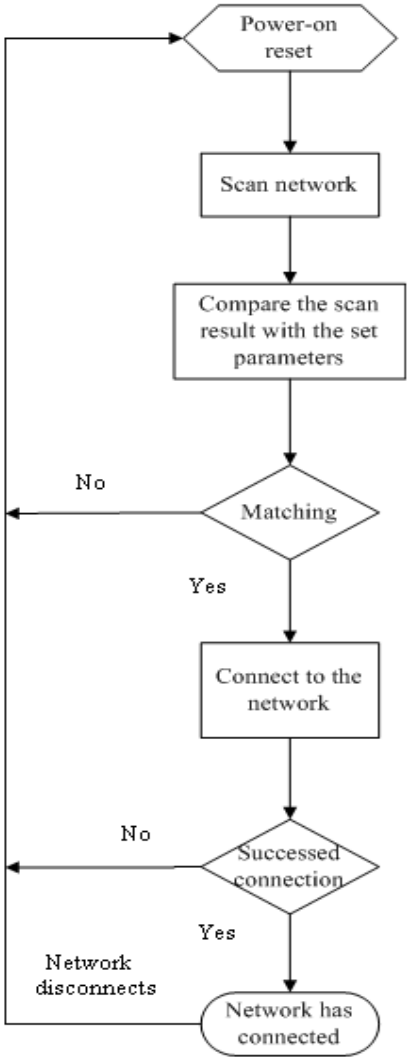
4、Server disconnects the TCP connection when TCP Data format is used.

If a situation occurred as the following, WLAN module will automatically scannetwork status：

1、The AP of the target network is off.

2、WLAN module leaves the signal coverage of AP.

Its work processes as follows.



In automatic mode,all networking process is completed bu WAN module automatically without any user intervention,to provide for users with one of the most

simple way.to success to connect the network,users only need to set at least one group of basic parameters once at the first use.Then WLAN module will scan the network in each power-on reset automatically, if the target network is Detected,networking will be connected automatically,and user can receive the the message of success networking after successful connection,then user can transport data normally.If the network disconnected accidentally in the middle,the module can do automatic connection.In the case the AP in the network is off or WLAN module has leaved from the signal coverage of the network,WLAN module may do automatic scan until scanning practicable network.

This module can set at most seven target network at the same time.When more then one target networks in the current area,WLAN module may connect automatically to the first practicable network.

2.3.2. Manual Networking

In the manual networking mode,users need to control connection and disconnection of WLAN module by order.

2.4. Encrpytion

WLAN module supports WEP, WPI, CCMP these three data encypytion mode and non-encryted OPEN mode.

- **WEP**

  In the encrpytion mode of WEP, user can set 4 groups of key,and choose one group as tolerant sending key.the length of the key is divides into two styles:64 bit and 128 bit

  - 64 bit key

    Besides 24 bits stochastic data,the length of the key user needs to set is 40 bits,as 5 bytes.

  - 128bit key

    Besides 24 bits stochastic data,the length of the key user needs to set is 104 bits,as 13 bytes.

- **WPI**

In the encrpytion mode of WPI,user needs to set 32 bytes key,broadcast is achieved from AP automatically.

- **CCMP**

In the encrpytion mode of WPI,user needs to set 16 bytes keybroadcast is achieved from AP automatically.

2.5. Data transmission

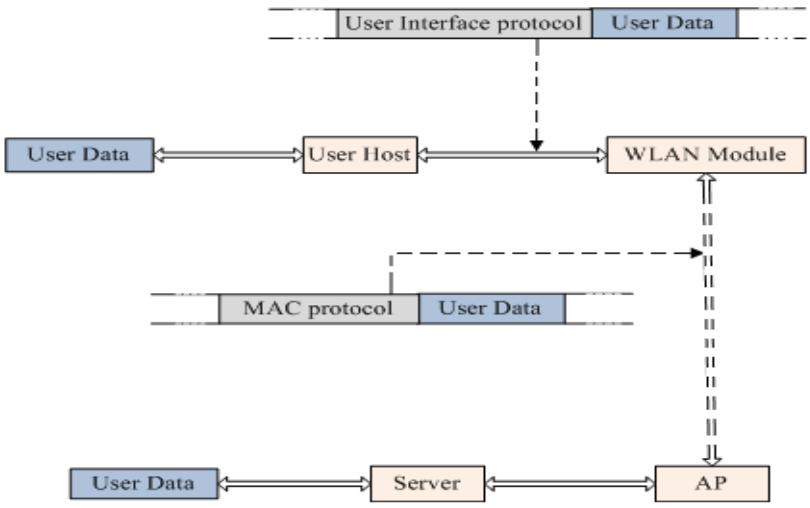
In networking status,WLAN module transmit automatically the effective data that has received between user serial (UART) and wireless network serial.

According to the user setting,the Data Link Layer of WLAN module can do the data transmission in RAW, UDP and TCP data formats.

2.5.1. RAW format

It's the raw data format,this format no longer do the additional encapsulation to the user data in the transmission process of Link Layer, but directly change to 802.11 network frame to transmit.In this format,WLAN module uses the MAC address of the server as the target address of data transmission.

Data transmission model is as follow:

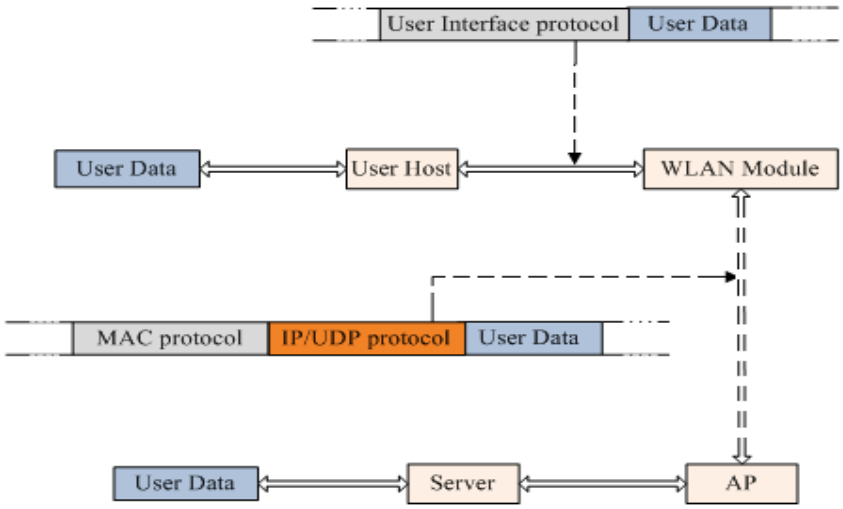


2.5.2. UDP format

UDP，that is User Data Protocol,It’s Connectionless Data Transmission Protocol in TCP/IP protocal stack.UDP protocol supports unreliable data transfer,and does not guarantee the integrity of the data.But UDP uses little network sourceand supports quick data manage,therefore it’s suit for the occasions that the demand of transmission real-time is strict ,but the demand of data integrity is low-rise,such as Audio and video data transmission.In addition,using UDP format can achieve the data broadcast.

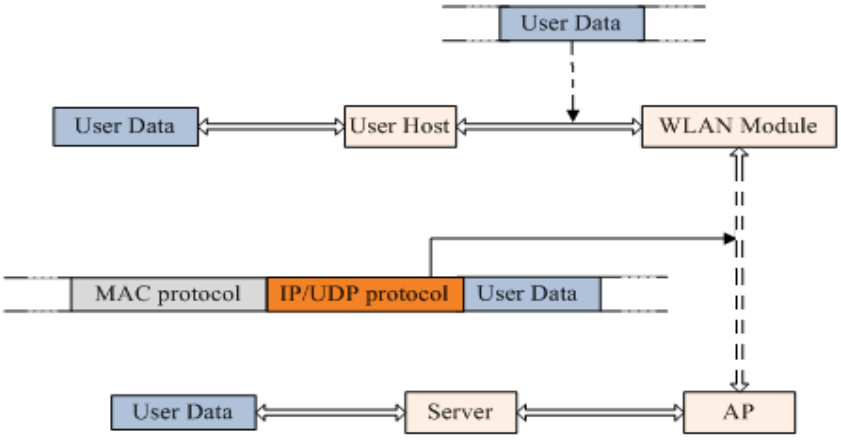
When Link Layer of the WLAN module uses UDP format,the information include device IP address, server IP address and service port number must set accurately,if server and WLAN module are not in the same subnet,subnet mask and gateway are must be set,otherwise they wouldn’t be able to communicate (the setting of IP address and port number must accord with the provision of TCP/IP protocol).

Data transmission model is as follow:



- **Transparent transfer mode**

In UDP format ,WLAN module also supportstransparent transfer mode.What istransparent transfer,it indicates that WLAN module transmite “transparently” the data received from the serial to the network.Data transfer model is as following:



To get in transparent transfer status must fulfil the following conditions:

1、Using Automatic Networking mode;

2、Using UDP Link Layer data format;

3、WLAN module is in successful networking status;

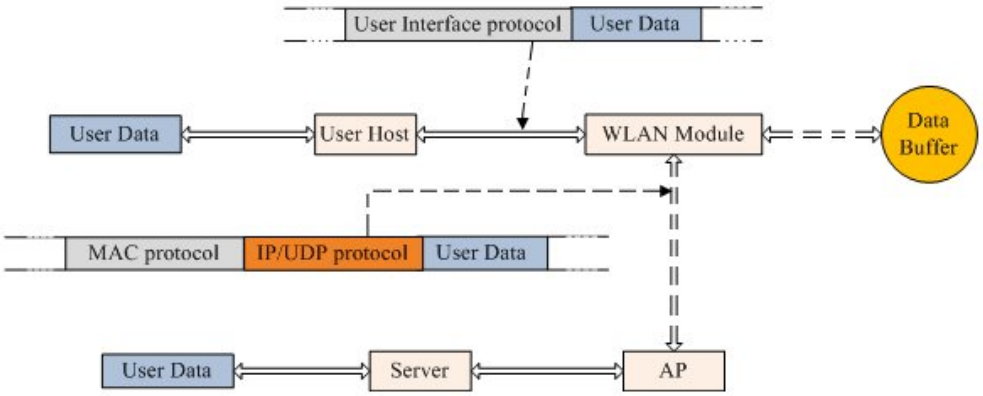
What must need to notice,WLAN module gets in transparent transfer status,then cannot receive user's order from UART serial.(before using simulation environment to do the testing and demonstration,please turn off the WLAN module client software,and use general-purpose serial tools,such as Hyper Terminal,serial debugging assistant,etc. to do the data transmission testting).

2.5.3. TCP format

TCP is connection-oriented Transmission Control Protocol,a virtual connection is created between both sides of the communication.TCP supports reliable data transmission,out-of-order, loss, damage and issues such as appear in the process of transmission are all able to answer for comeback.

At using TCP format in Link Layer,strongly adviced,user should enable ACK at the time sending data through UART serial, namely use the sending/responsion manner to further ensure the reliability of transmission.

The data transmission midel of using TCP format is as follow:



- **TCP Monitoring mode**

When Link layer is set to TCP format,WLAN module can not only be used as the client to connect to the TCP server set in the network parameter,but also work as TCP server after starting monitoring mode.To set system parameter can enable or close TCP Monitoring mode,when the data format of Link Layer isn't TCP,this parameter can be neglected.According to the status of TCP monitoring mode,the networking process of WLAN module is different:

- Close TCP Monitoring

  WLAN module has associated with AP successfully,then automatically connect to the server contents with the network parameter setting,and returns the message of successful networking to user side after building TCP connection with the server,otherwise,return failed message.At the time,the process of the module is the same with theWLAN module of 1.3 and previous versions which do not support the TCP Monitoring mode.

- Enable TCP Monitoring

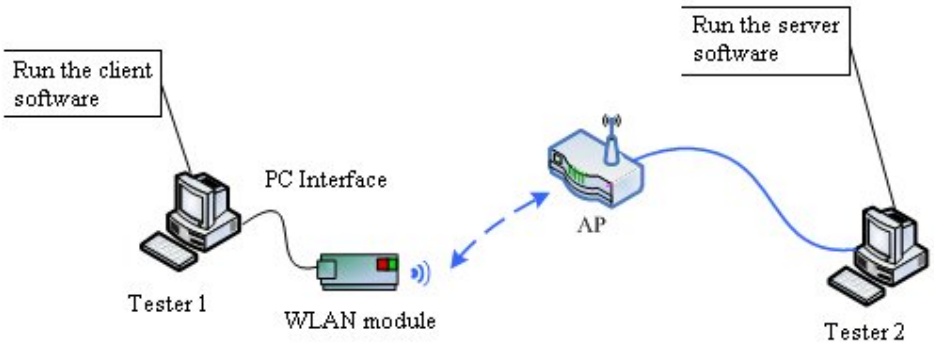
  WLAN module returns the message of successful networking to user side after connect with AP successfully,then WLAN module get in TCP Monitoring mode,it can accept extrinsic TCP connection requests.If user wish it works as the client to connect to the server,you can use TCP Connection Order Control to initiate the connection request.

This module does not support building multiple TCP connections at the same time,if currently a TCP connection already exists,it can no longer receive or send new connection requests.

3. Test Environment Guide

WLAN module is as a functional unit,can only run during embedding in the system.Therefore,we support the following simulation running environment for users to do the module function testing.

3.1. Summary



All of the running environment is constituted with the following devices:

- **Tester 1**

It uses to run the client software of WLAN module,and communicates with WLAN module through the computer serial,the function achieved includes:

1、Send control order to WLAN module；

2、Receive and analyse the message send by the WLAN module；

3、Set/demand the configuration parameters of WLAN module;

4、Cooperate with server software to run data transmission testing；

- **WLAN module**

It’s composed by the STAU network card supports UART serial running this software,the function achieved includes:

1、Wireless networking function；

2、Data transmission between serial and wireless network；

- **AP**

It’s used to build a wireless network.

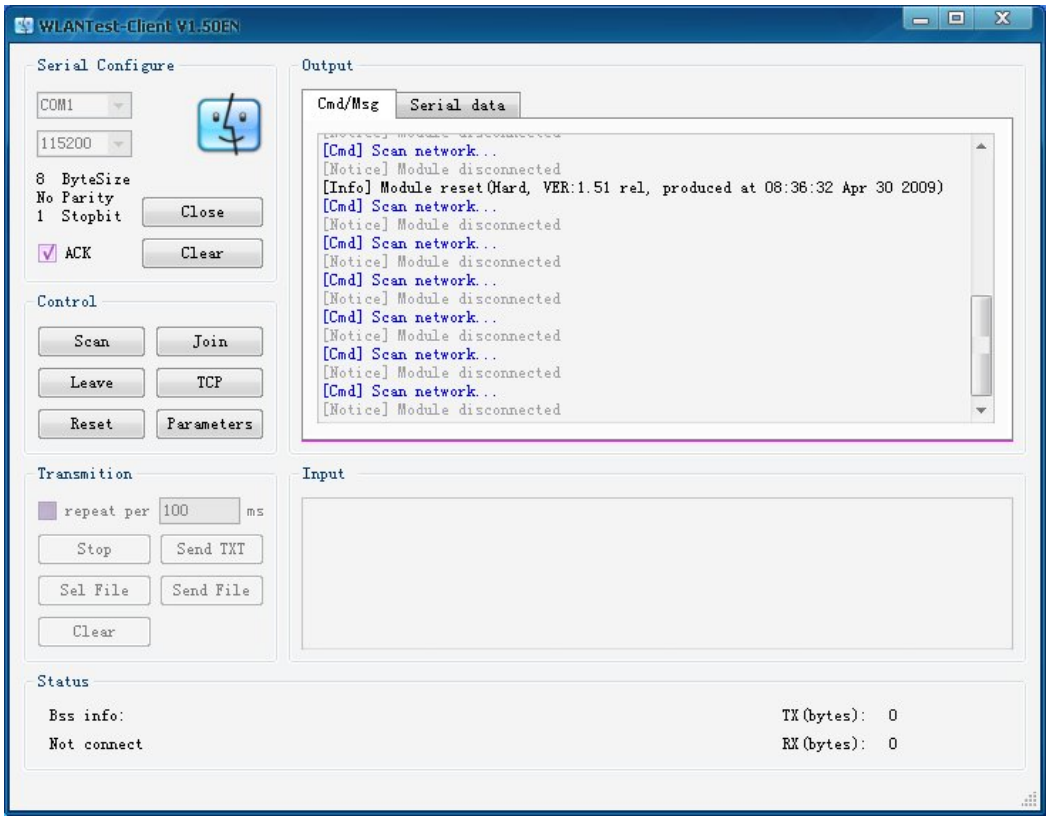
- **Tester 2**

It’s used to run the server software of WLAN module,this computer must have network connection,the function achieved includes:

1、Do the data transmission testing with client software;

2、Be the upgrating online server of WLAN module firmware.

3.2. Client Software



The client software connects to WLAN module through the computer serial,and achieves the following functions:

- **Serial Configure**

  The choose of serial baud rate,includes 19200、38400、57600、115200.

- **Sending control order**

  Send control order to WLAN module by clicking the buttons,the order supports include scanning network, join network,leave network,parameter configuretion, reset.

- **Receiving control message**

  Analyzing the control message received,and displaying the result in the export window.

- **Parameters configuration**

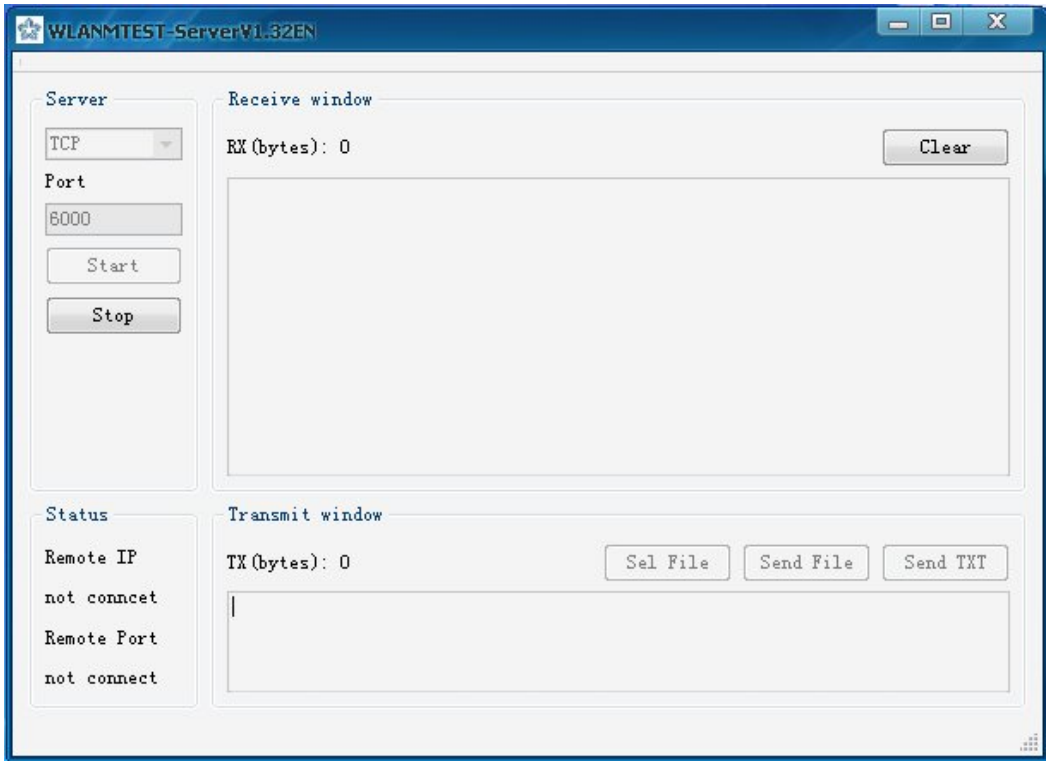
  Analyzing and modifying the system parameters and the 7 groups of network parameters of WLAN module.

In the status of networking,sending and receiving data including text data and document through wireless network with server software.

- **Serial Data Detection**

Be able to snatch at the data frames of serial communication,and can get the dataframes of serial communication,be convenient for users to use UART serial protocol to do the secondary development.

3.3. Server Software



Server software runs on the computer with the network connection function.When the computer and WLAN module connect to the network built by the same AP, then it can do the data transmission testing with the client software.

- **UDP Testing**

Build a UDP server,set the Link Layer data format of WLAN module as UDP,then you can do the data communication with it,including sending and receiving text,receiving document.In this mode,the server does not support the function of sending document.

- **TCP Testing**

Build a TCP server, set the Link Layer data format of WLAN module as TCP,then you can do the data communication with it,including sending and receiving text and document.

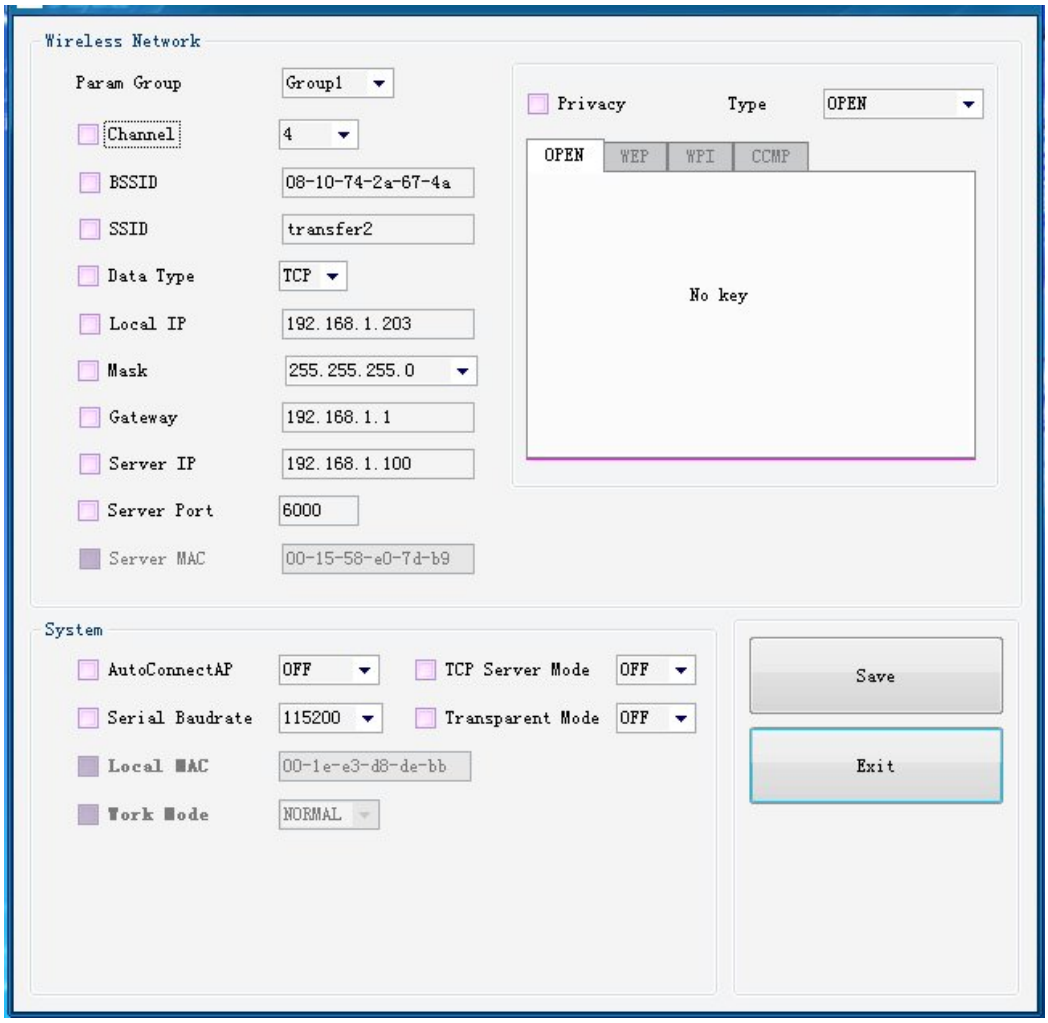
- **Upgrate Online**

Work as the online upgrate server,achieved remote firmware upgrade functionality of WLAN module.

3.4. Parameter management

3.4.1. Parameter query/edit

Client software can be used to manage the parameter of WLAN module,the following is to modify the encryption method of network parameters as an example to illuminate the method of modifying parameter:



1、Click the “parameter configuration” button(please don’t set the parameter during transmission)

2、Choose parameter index

3、Select the choose box of encryption setting,and modify the encryption types.

4、Click the “parameter setting” button.

5、Modification is finished.

3.4.2. Parameter Explanation

Network parameter includes the parameter needed by connecting to AP and server,this module supports 7 groups of network parameter setting,the meaning of each parameter is that:

- **Parameter Index**

  The index number of the group of network parameter.

- **Channel、SSID、Encryption style、Key**

  These are all the configuration parameters,please refer to the setting of AP.

- **BSSID**

  It indicates the MAC address of the target AP.

- **The data format of Link Layer**

  It indicates the data format used by the transmission between WLAN module and server,the setting here must be the same with the setting of the server which connects to.(Note:the server software in this testing system can only support UDP and TCP these two data formats)

- **Device ‘s IP address**

  It indicates the IP address of WLAN module,and it’s arbitrarily designated by users,but it must be sure that the setting IP address is the legitimate IP address of the tsrget AP and dosen’t be used.

  What specially needs to explan,the address have nothing to do with the network card’s IP address of the tester 1,which computer the client software run on.

- **Subnet Mask**

  It indicates the subnet mask of the network WLAN module exists in.

- **Gateway IP Address**

It indicates the gateway IP address of the network WLAN module exists in.

- **Server IP Address**

  It indicates the IP address of the network card of tester 2.

- **Service Port**

  It indicates the monitor port of server,its setting must be the same with the server.

System parameter embodies one group,and it's used to control the work mode of WLAN module,the mode includes:

- **Networking mode**

  It indicates that users can choose auto and manual this two type in the parameters of networking mode.

- **Transparent Transfer Mode**

  It indicates transfer format of serial data,and it's able to be chose enableo or close.What is needed to notice,transparent transfer function can only be effective when networking mode is automatic and data format of server is UDP.Except this instance,this parameter can be ignored.

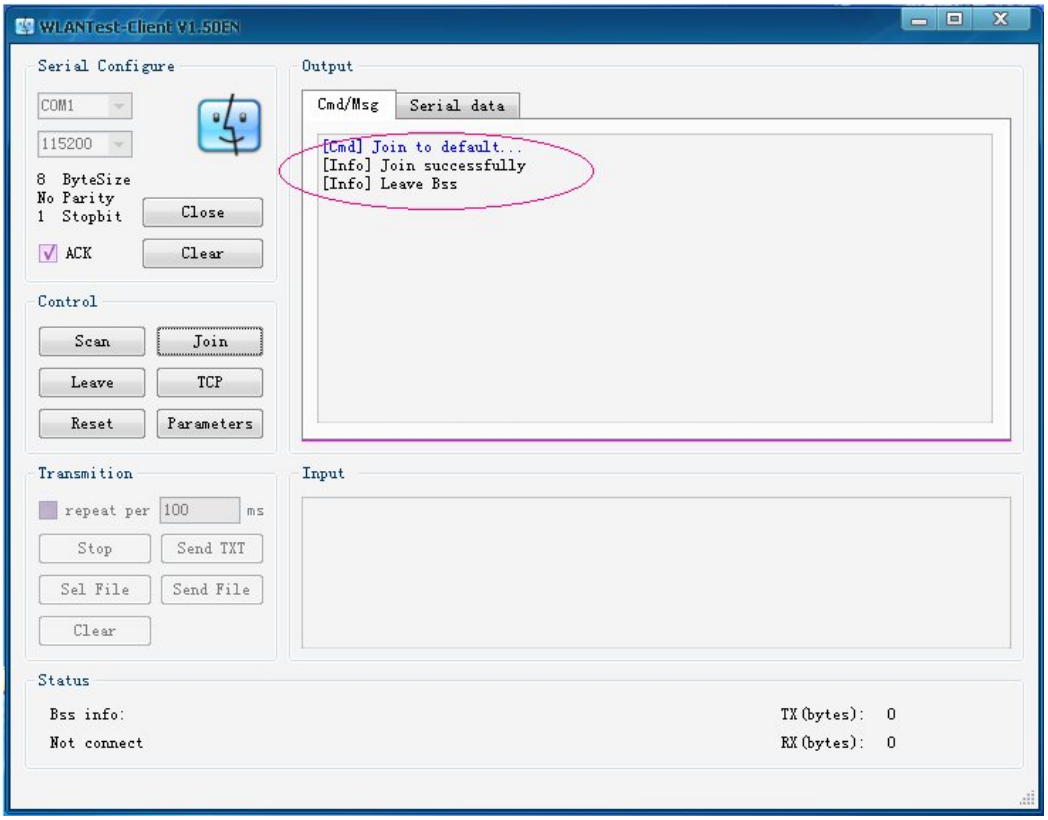
- **Serial paud Rate**

  It indicates communication speed of serial,its configuration is the serial transfer speed of the hardware of WLAN module,the serial speed setting of the client software can refer to the serial setting column of the main window of the software.The speed between both sides must be the same,otherwise the communication between the client software and module can't go along.

3.5. Automatic networking

In automatic mode,all process of networking is finished automatically by WLAN module without user's control,so that supports a most ordinary method.User only needs to set at least one group of network parameter once,then WLAN module will scan network automatically after power-on reset,if module has scaned the target netwprk,then connects automatically,and sends the message of connection has

successed after successful connection,that is as follow.

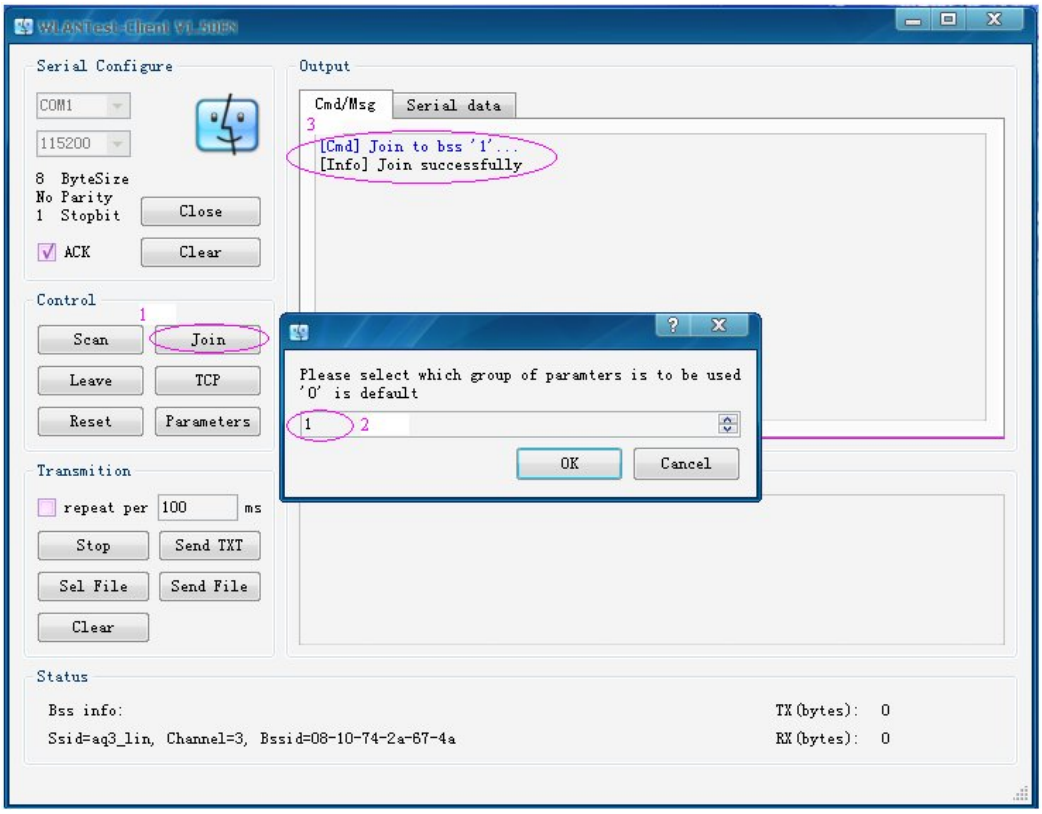


3.6. Manual networking

Manual networking mode supports a more flexible use method for user.user cancontrol the module to scan, network, transport dataand etc. with order.

User can send all kinds of orders to WLAN module during using the client software,the orders are as follow:

- **Connect to the network**

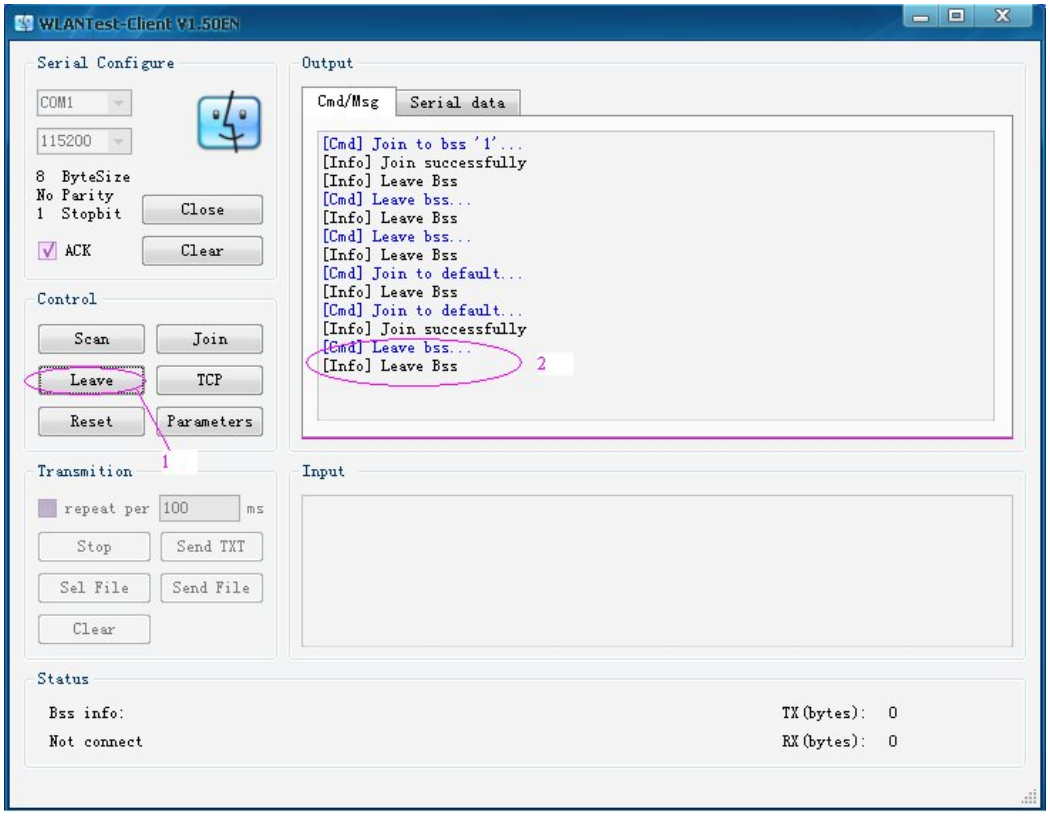


1、Click the “Join” button;

2、Please choose the group network parameter what’s needed,then click “OK”;

3、Connect successfully；

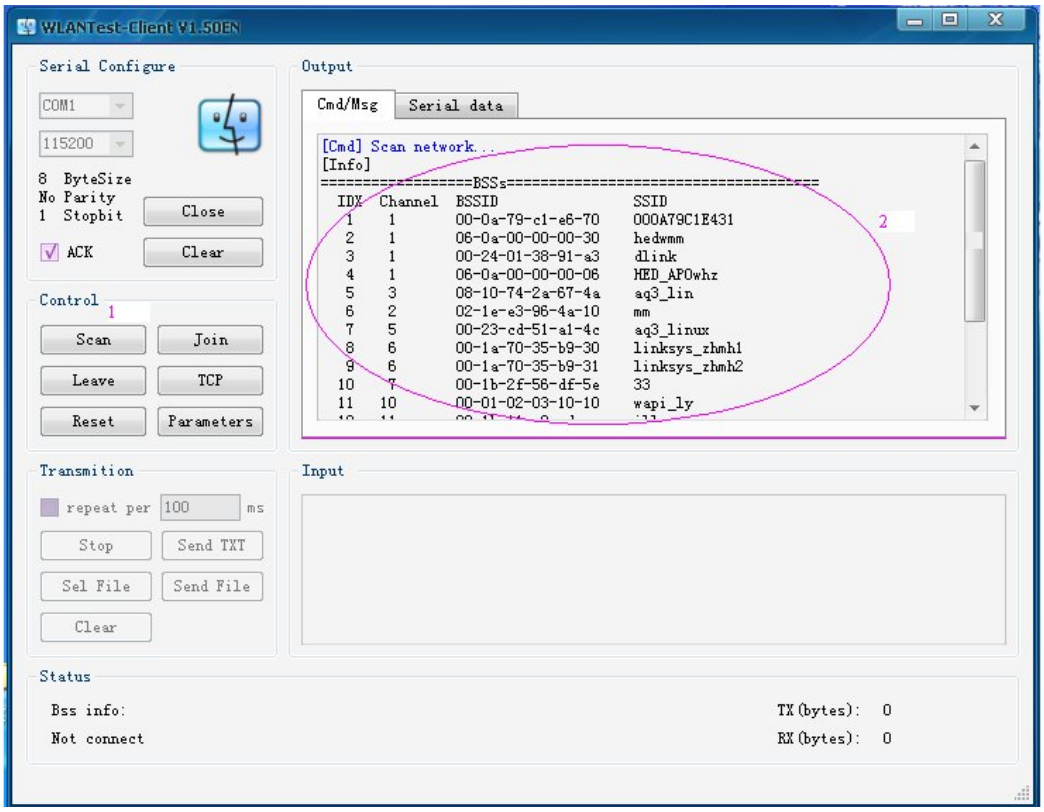
- **Disconnect the network**



1、Click “Leave” button;

2、Disconnect successfully;

- **Scan the network**

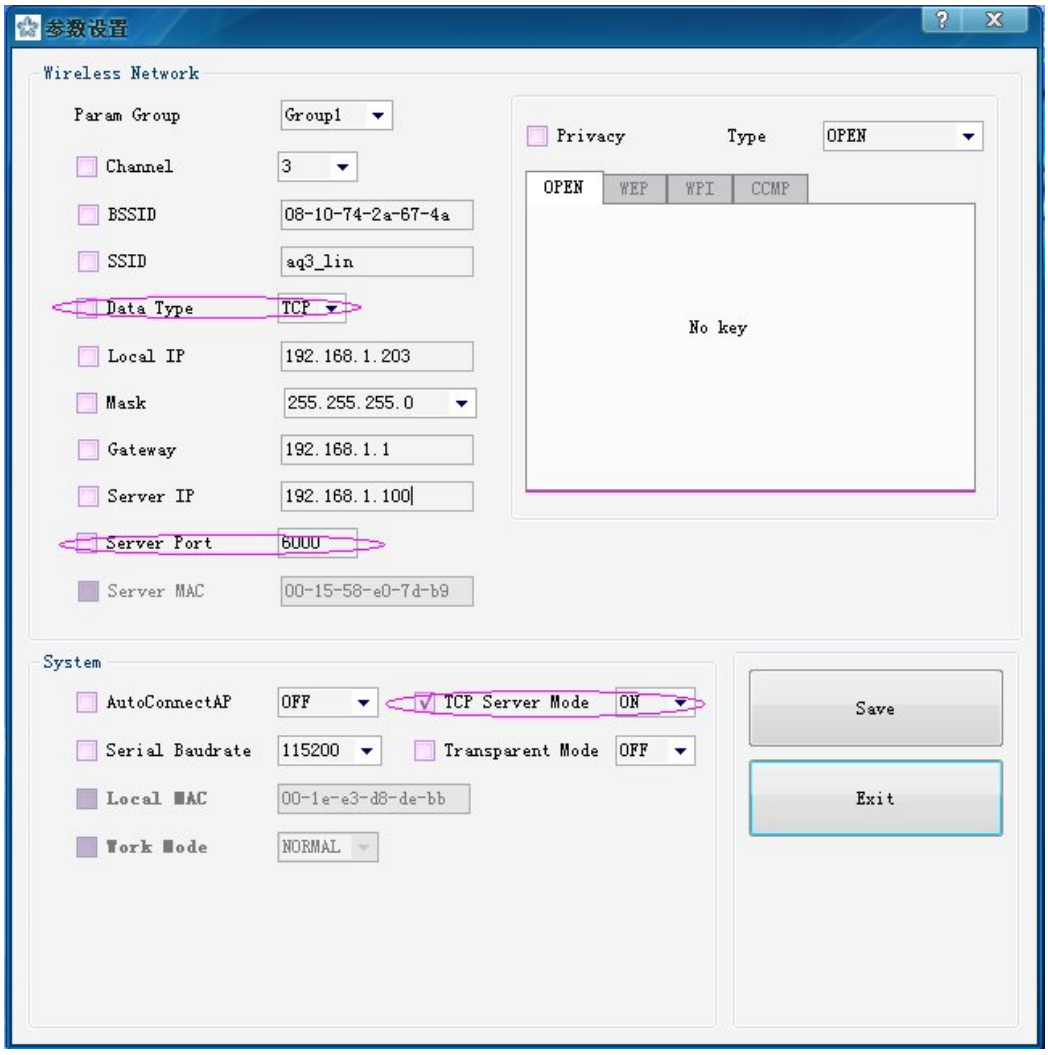


1、click “Scan” button;

2、return the scan result;

3.7. TCP Monitor Mode Test

1、Exactly set the network parameters,and enable TCP monitor mode;



2、WLAN module gets in monitor status after successful networking;

3、Use the Internet Explorer program in tester 2,and connect to WLAN module as drawing method, fill in IP address and port according to actual setting value;

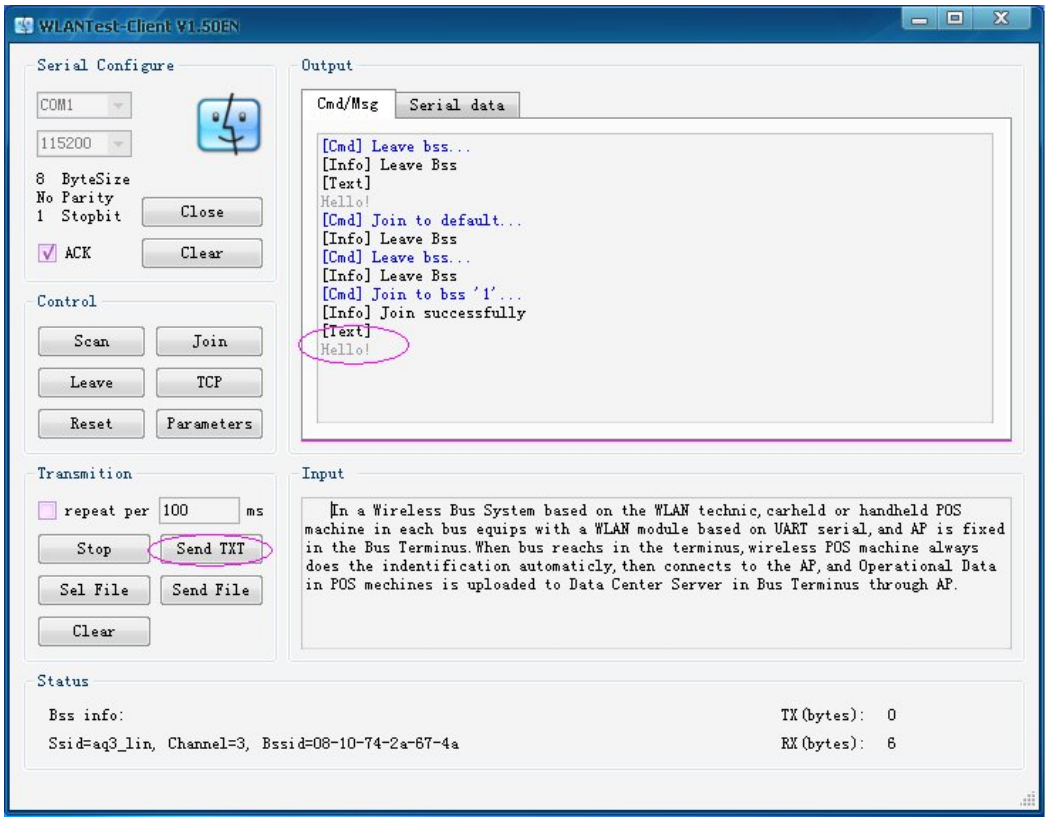
4、WLAN module receives the request and connects to IE with TCP,the client software will show the message of successful TCP connection and HTTP request data sent by IE from this connection;

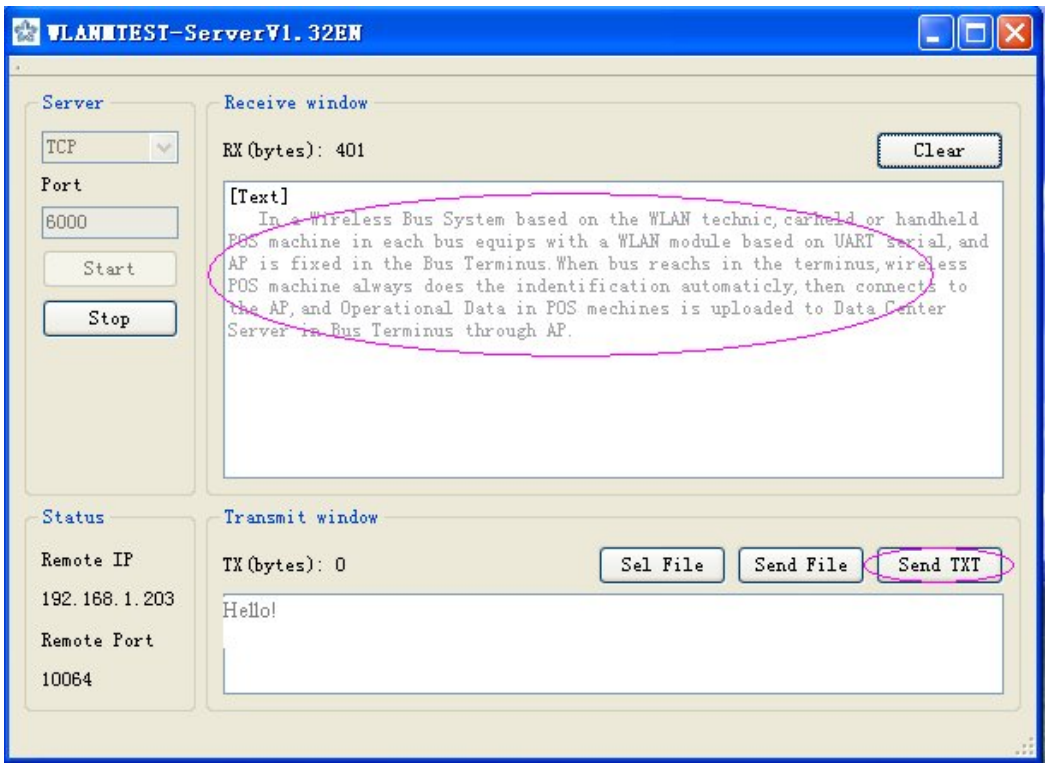
5、Input random character string in the input window of the client software,click"text sending",then click the "TCP connection" button and choose "disconnect" to disconnect the TCP connection,show as the following drawing;

6、User can see the content of the text input in the client software in IE window;

3.8. Text Transfer Test

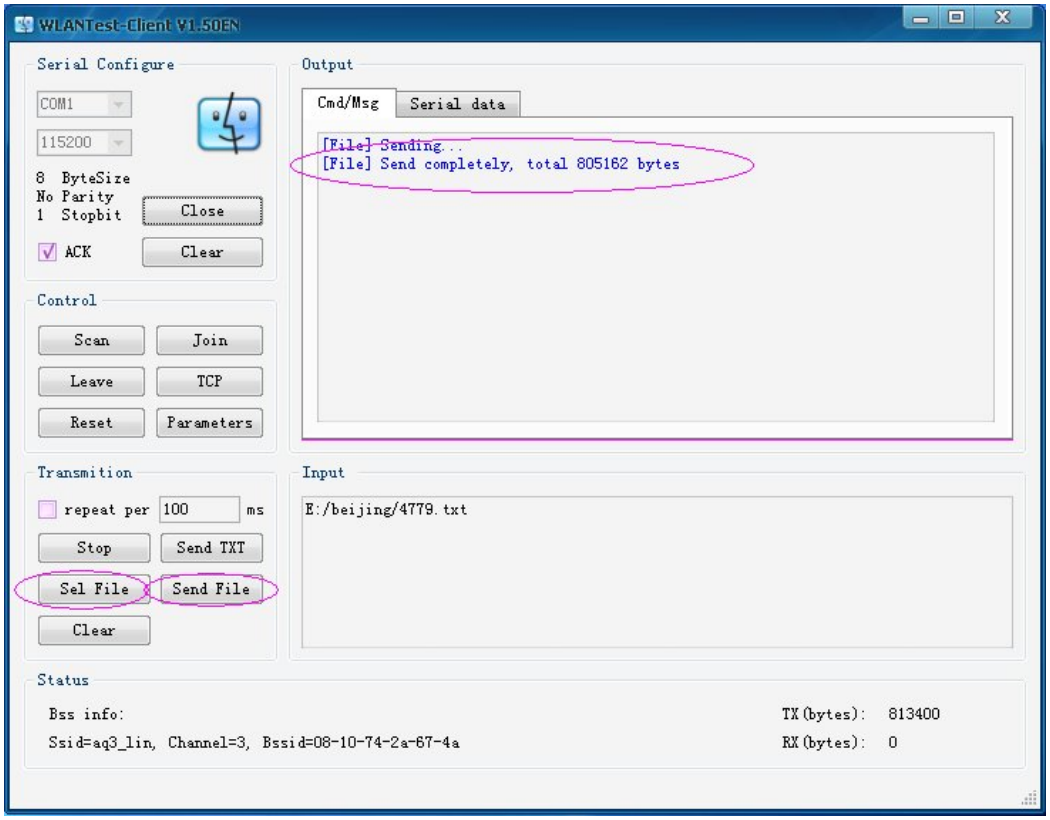
WLAN module connects successfully, then use the client and server software at the same time to do the text transfer test as the following drawing.

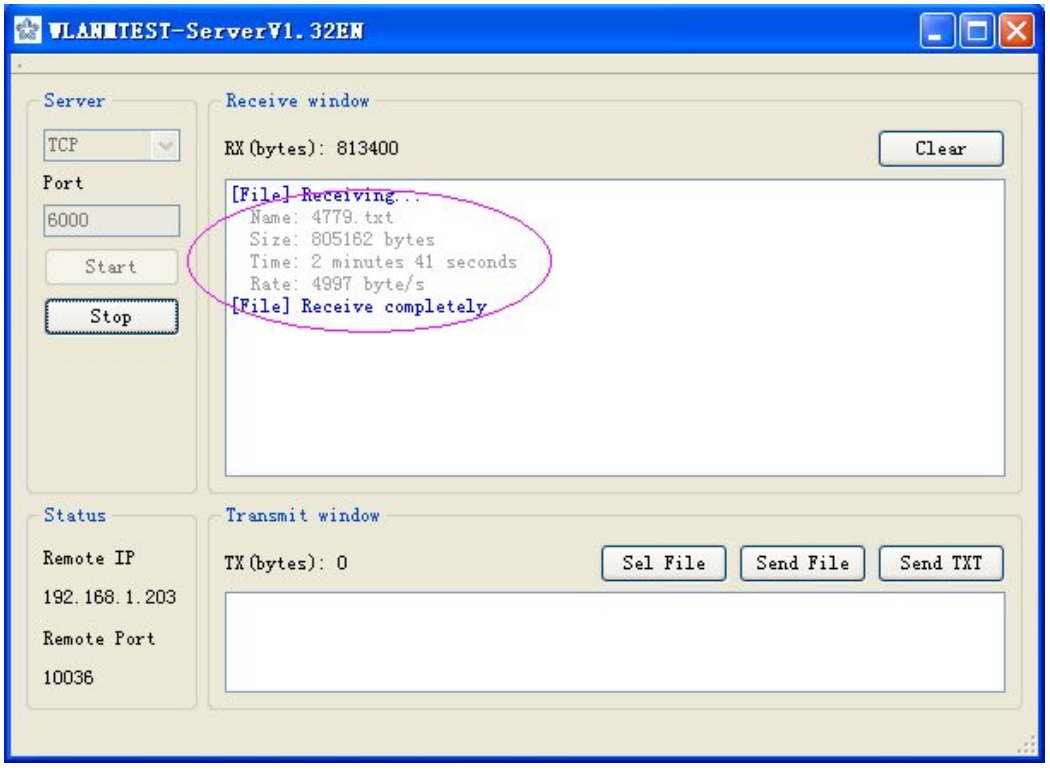



WLANTEST-ServerV1.32EN
Server
TCP
Port
6000
Start
Stop
Receive window
RX(bytes): 401
Clear
[Text]
In a Wireless Bus System based on the WLAN technic, carheld or handheld POS machine in each bus equips with a WLAN module based on UART serial, and AP is fixed in the Bus Terminus. When bus reachs in the terminus, wireless POS machine always does the indentification automaticly, then connects to the AP, and Operational Data in POS mechines is uploaded to Data Center Server in Bus Terminus through AP.
Status
Remote IP
192.168.1.203
Remote Port
10064
Transmit window
TX(bytes): 0
Sel File
Send File
Send TXT
Hello!

3.9. Document Trabsfer Test

The client and server software also support the document transfer between each other,showed in the following drawing is the procees that the client sends document to the server.





What needs to regard,when WLAN module uses UDP data format,it only

supports that document is sent by the client to the server,and UDP is uncertaint,document transfer may be disconnected by network matter.to ensure the transmission reliably,please use TCP format.

3.10. The Answers of Familiar Questions

Questions：Why the“[Notice] Module disconnected”message appeared at thetime the client sends the control order?

Inspect that the serial setting of the client software is accurate or not;
Inspect that WLAN module is power-on or not;
Inspect that WLAN module is in transparent transmission mode;

Questions:Why the module may return failed connection?

The reason of failed connection is manifold possibility,
First,the target network can’t be used
a. Inspect that the power of AP is on and the configuration is accurate or not;
b. Scan network manuslly,be sure the target network can be scaned;
c. Inspect that the wireless mode of AP is be set to B or B/G mixed mode or not;

Second,parameter configuration about AP in network paramneter is not accurate
a. Inspect the configuration of WLAN module ,ensure channel,BSSID,SSID and encryption setting is the same as the setting of AP;

Third,if Link Layer data format is TCP,the incorrectness of parameter configuration about service in network paramnter also cause failed connection
a. Inspect that MAC address of server,IP address of device,IP address of server and service port settting is accurate and legitimate or not,thereinto,
MAC address of server indicates the physical address of the network card in the computer which the server software runs in.
IP address of server indicates the IP address of the computer which the server software runs in.
Service port indicates the service port set in server software.
IP address of device indicates the IP address set for WLAN module,it must be in a network sect with the IP of server.

Question:Why is my secret key always be incorrect?

The express method the client software of this system used may be different from your AP and need to do the format conversion,the following is a example used 64bits WEP key to express the conversion method:

The key of AP uses hexadecimal format:

In case the key of AP is 10 hexadecimal numbers: 1234567890

The after conversion express as 5 hexadecimal numbers:0x12, 0x34, 0x56, 0x78, 0x90

The key of AP uses ASCII format：

In case the key of AP is 5 ASCII bytes：abcde

The after conversion express as 5 hexadecimal numbers：0x61, 0x62, 0x63, 0x64, 0x65

（Please refer to the normal ACSII character set about the express of ASCII byte's hexadecimal, common christcross-row and number can use the following method to count:

The hexadecimal number of character 'A' is 0x41,the charater 'B' is 0x42,and reckon as this;

The hexadecimal number of character 'a' is 0x61,the charater 'b' is 0x62,and reckon as this;

The hexadecimal number of character '0' is 0x30,the charater '1' is 0x31,and reckon as this;

）

Question:why is that thing at using TCP format,failed connection or rapid disconnection after successful connection always appear?

TCP connection is a imaginary connection,if the network connection disconnects abnormally(such as power-off and manual reset),then the connection between WLAN moduleand the srver can't backout normally,and this causes reconnectd to the server failed,the method of resolving the question is as follow:

a. restart the server software;

b. set different service port;

Question:why can not the server receive any data?

a. Inspect that encryption type and key setting in network parameters accord with the setting of AP or not;

b. Inspect that IP address of device, IP address of server and service port in network parameters set accurately or not;

c. Inspect that the firewall of the computer which the server software runs on turns off or not;

Question:what relation ship between the network card IP address of the computer which the client software runs in and IP address of device in configuration parameters of WLAN module?

WLAN module has the function of network connection itself,and doesn't use the network connection of Windows system in the computer the client software runs in,so IP address of the network card has nothing to do with WLAN modul.

In the demo system,the both sides of the communication is:

IP of the WLAN module device

IP of the network card in the server computer

Question:why does the server software show the non-connection status after my client has returned successful connection,when UDP format is used?

UDP protocol is connection-oriented connectionless,the server software can only getthe address message of data sender after it has received the data in monitor port, thus the client must send a little data to the server as communication source beginner at first.

This problem will exist when TCP format is used.

Question:why is the network delay at using WLAN module be bigger than the normal instance.?

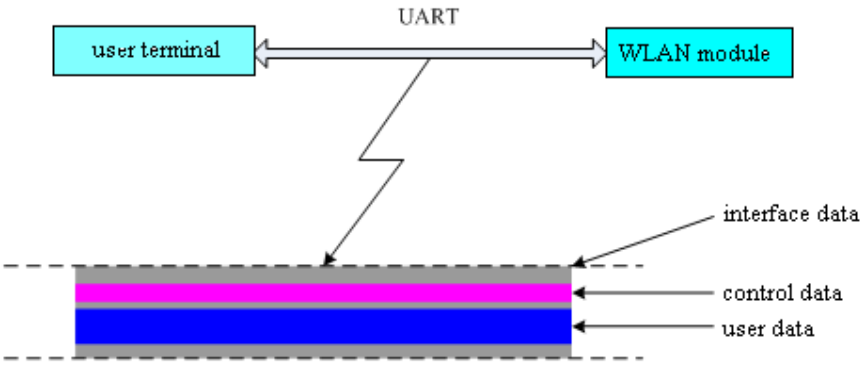
Inspect that the wireless network mode of AP is B or B/G mixed mode or not.

Question:how does the transparent transmission mode be droped out?

Turn off the power of AP, afresh turn on the WLAN module,use the client software to modify the configuration parameters and then it's complete.

4. Serial Protocol

4.1. summarize



Interface Data:

The format and transfer mechanism of the data transports between user terminal and WALN module through UART serial,is prescribed by the corresponding serial protocol.

Serial data may include control data and user data this two different types.

Control Data:

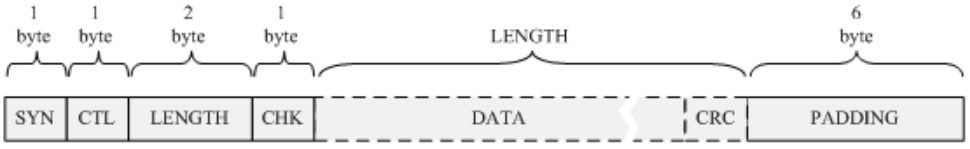
The control order definition and mechanism of control message transfer between user terminal and WALN module, is prescribed by the User Serial Control protocol.

User Data

It indicates user’s private data,its protocol is defined by user.

4.2. UART serial protocol

4.2.1. Data Format

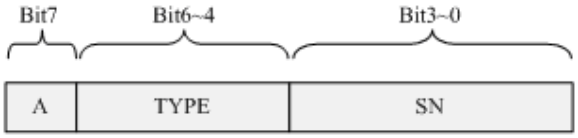


SYN：

Synchronized Field,it indicates the start of a data frame,the fixed value is ‘0xAA’.

CTL：

Control Field,its meaning is as follow,



TYPE：frame type,

000b,it indicates the control data

001b, it indicates the common data

010b,it indicates the ACK acknowledgement to the previous frame,LENGTH 表 field must be 0.

Others is reserved.

A this bit in data frame must be set as ‘1’,it indicates the data frame includes CRC and the receiver needs to return ACK acknowledgement;it has nothing in ACK frame.

SN is the short of sequence number,the range of its value is 0~15,in data frame,if it is the retry of the previous frame,then sequence number retain invariable,or the sequence number rise 1 every time;In ACK acknowledgement frame,SN is equal to the sequence number of the previous frame received.

LENGTH：

LENGTH field, it indicates the length of DATA field,the most longth is 1400 bytes.

CHK：

Frame Head Verification field,its count is 8 bits Circle Reundancy Check sum of CTL and LENGTH this two fields.

DATA：

Actual transfer data,if ‘A’ is set ‘1’,the last byte of DATA is 8 bits Circle Reundancy Check sum of the previous (LENGTH-1) datas.

PADDING：

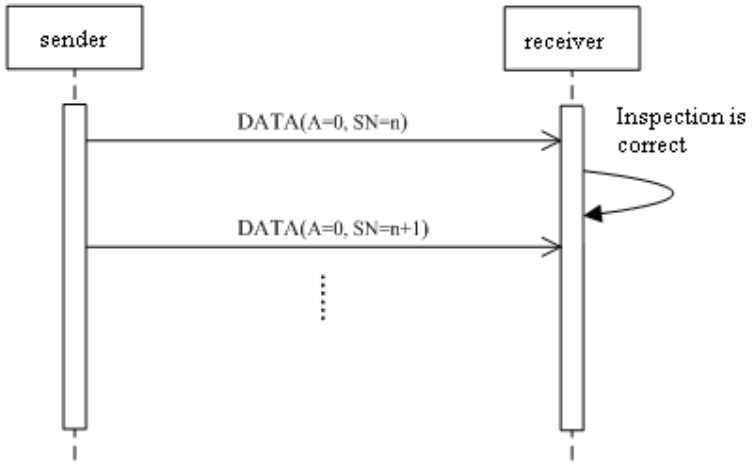
Fill field of frame end,its value is 6 continuous ‘0x00’.

4.2.2. Transfer Mechanism

According the types of the frames,two different transfer mode are used.

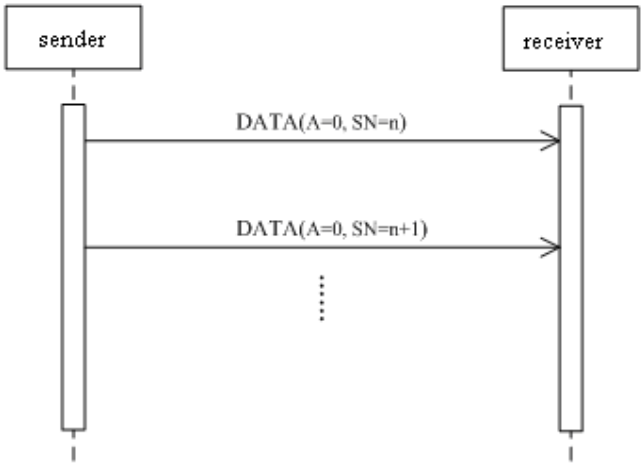
- Send/response Mode

The data frame which A is set ‘1’ uses this transfer mode.The sender needs to wait for the responsion from the receiver after the sender has sent a frame of data,then it starts to send the next frame,it is as follow.



- Continuous sending mode

It is the sending mode of the data frame which A is set ‘0’.The sender can continuously send the next data after it has sent a frame of data,and doesn’t need to wait for the acknowledgement of receiver.



4.2.3. Serial Configuration

In this project,the following is the configuration of the UART serial.

Paud rate：19200/38400/57600/115200bps

Data bit：8bits

Parity bit：none

Stop bit：1bits

flow ：none

4.3. User Serial Control Protocol

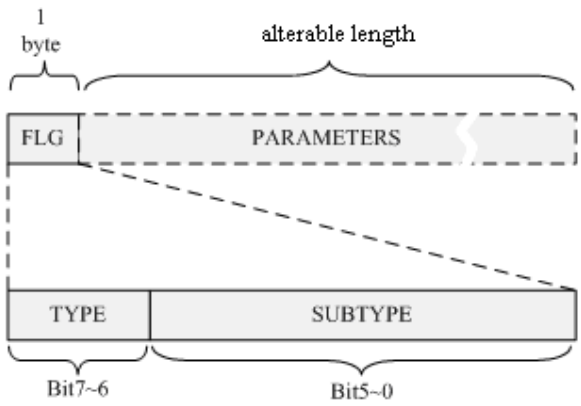
4.3.1. Data Format

This protocol is used to defined the format of the control data transported throughUART user serial.Control data includes the two following types,COMMAND and MESSAGE.

COMMAND:the receiver must enforce corresponding operation according to thecontent of the command,in this system,command can only be emitted by the mainframe.

MESSAGE:it indicates the message that the sender needs to send to the receiver,and need not the response of the receiver.

The definition of data format is as follow.



TYPE：

00：order,mainframe to WLAN module

01：message,WLAN module to mainframe

10：reserved

11：reserved

SUBTYPE：

000000b：scanning

000001b：connect to the network

000010b：disconnect to the network

000011b：set parameters

000100b：inquire the parameters

000101b：reset/ initialization

000110b：TCP connection

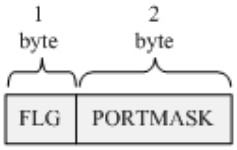
000111b：TCP failed sending

Others：reserved

PARAMETERS：

They are defined according to the difference of TYPE and SUBTYPE.

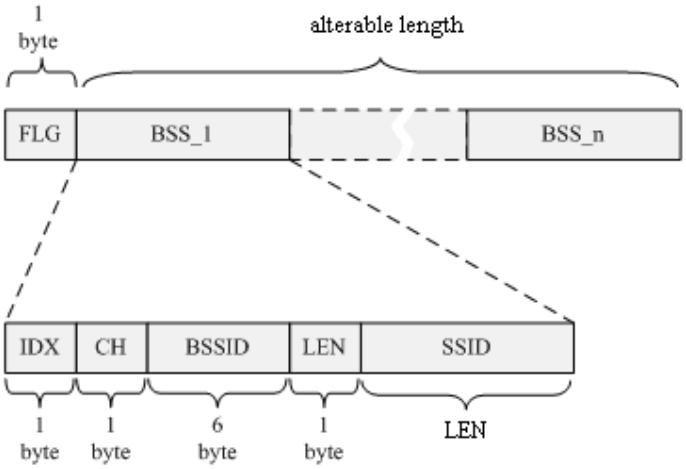
4.3.2. Order of Starting to Scan Network



FLG：0x00

PORTMASK：channel mask,the first byte represents 1~8 channels, therein Bit0 represents Channel 1,Bit1 represents Channel 2,and others calculate as this in turn.The low 6 bits represent 9~14 channels.

4.3.3. Message of Scanning Network Result



FLG：0x40

IDX：In the firmware of which the version is less than or equal to 1.51, it indicates network number, and used to return the index number of result of scanning network,the number begins from 1,each network number rises 1.

Beginning from the Version 1.53 firmware,this parameter is indicated to intension of signal,and used to return the intension of signal of the target network,the range of its value is 0~255, ‘0’ indicates the best intension, ‘255’ indicates the lest intension.

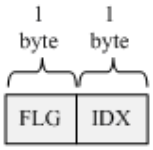
CH：Channel number

BSSID：BSSID of network

LEN：the length of SSID

SSID：SSID of network

4.3.4. Order of Starting to Connect to Network



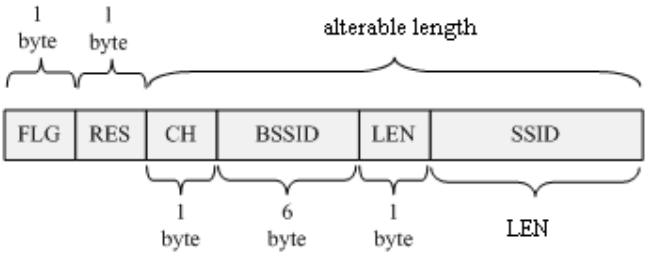
FLG：0x01

IDX：0，and indicates tolerant configuration network

1～7，indicate which group of network configuration parameters is used

others，no defined

4.3.5. Message of Network Connected



FLG：0x41

RES：0，indicates connection is successful

Others，connection is failed,and the latter fields after RES are insignificant

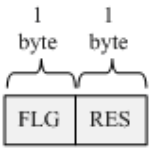
CH：channel number

BSSID：BSSID of network

LEN：the length of SSID

SSID：SSID of network

4.3.6. Order of Starting to Disconnect Network

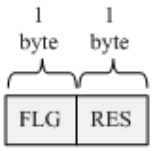


FLG：0x02

RES：0，disconnects normally

Others，disconnect singularly

4.3.7. Message of Network Disconnected

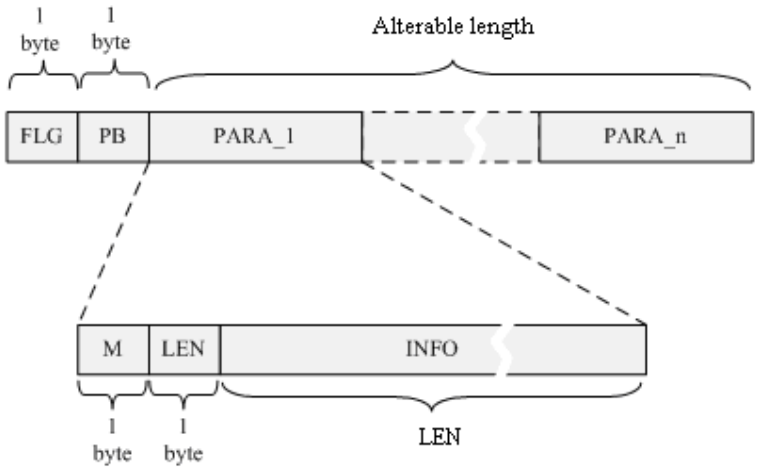


FLG：0x42

RES：0，disconnects normally

Others，disconnect singularly

4.3.8. Setting Parameter Order



FLG：0x03

PB：group number of network parameter,the range of value is 0xb1~0xb7,they express1~7 group of parameters.Parameter PB is choice field,this field can be not included if it's only setting system parameters.

M：Parameter ID，its definition is as following table.

Para ID	Parameter Meaning

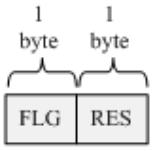
0x00	Reserved
0x01	BSSID
0x02	Channel
0x03	SSID
0x04	Encryption Type
0x05	Secret Key
0x06	Data format of Link Layer
0x07	Service Port
0x08	IP address of device
0x09	IP address of server
0x0a	MAC address of server
0x0b	Subnet Mask
0x0c	IP address of gateway
0x0d ~ 0xa0	Reserved
0xa1	* Serial type
0xa2	Serial paud rate
0xa3	* B/G mode
0xa4	* Tiptop speed
0xa5	* Send power
0xa6	* MAC address of device
0xa7	Networking mode
0xa8	* the degree of automatic connection after failness
0xa9	Transparent transmission mode
0xaa	TCP monitor mode
…	Reserved

(* the parameters set by the manufacturer can only be read by user)

LEN：length of INFO field

INFO：parameter content

4.3.9. Message of Setting Parameter Result

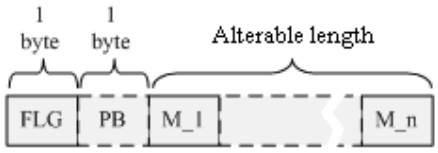


FLG：0x43

RES：0，successed

others，failed

4.3.10. Inquiring Parameter Order

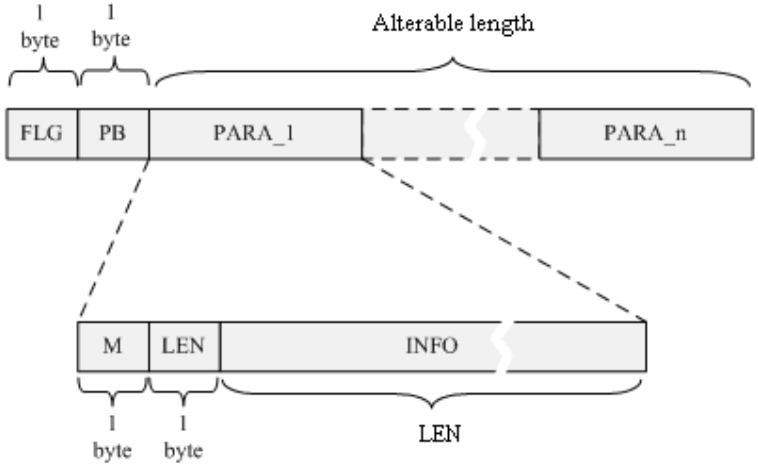


FLG：0x04

PB：group number of network parameter, and its definition is same as setting parameter order.

M：parameter ID, and its definition is same as setting parameter order

4.3.11. Message of Inquiring Result



FLG：0x44

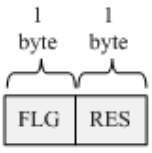
PB：group number of network parameter

M：parameter ID，and its definition is same as setting parameter

LEN：length of INFO field

INFO：parameter content

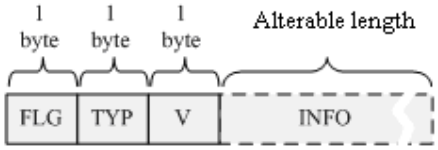
4.3.12. Reset Order



FLG：0x05

RES：no defined

4.3.13. Message of Finished Initialization



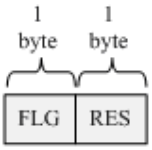
FLG：0x45

TYP：reset type,0－hardware reset,1－software reset,others－no defined.

V：version expression,and mixed value 0x76

INFO：character strings of firmware version message

4.3.14. TCP Connection order



FLG：0x06

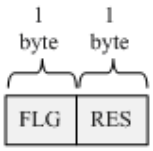
RES：

0 － connection is built

1 － disconnected

Other － reserved

4.3.15. Message of TCP connection Status



FLG：0x46

RES：

0 － connection has successed

1 － connection has been disconnected

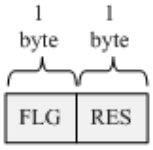
2 － connection is busy

3 － not join the network

4 － orders don’t support

others － reserved

4.3.16. Message of TCP Failed Sending



FLG：0x47

RES：no defined

4.4. Configuration parameters

WLAN module can support for user configuration parameters,their definition is as follow:

4.4.1. System parameters

- **Baudrate**

  Its length is 1 byte,and indicates the paud rate setting chose of UART serial,

  0 － 19200，1－38400，2－57600，3－115200

- **AutoConnect**

  Its length is 1 byte,and indicatesthe network mode of WLAN module, 0－manual，1－automatic.

- **Transparent**

  Its length is 1 byte,and indicates the choose of transparent transfer mode, 0－close,1－enable（this mode is omly effective in automatic networking and UDP data format）.

- **TcpServerMode**

  Its length is 1 byte,and indicates the choose of TCP monitor mode, 0－close,1－enable(this mode is only effective in TCP data format).

4.4.2. Network parameters

This module supports most 7 groups of network parameters,so the network parameters configuration has 7 group of network parameters,and index number is 1~7.Each group of parameters includes:

- **BSSID**

  Its length is 6 bytes,and indicates BSSID of the target network,its value is the MAC address of the AP used by the target network.

- **Channel**

  Its length is 1 byte,and indicatesthe channel of the target network,its effective range is 1~14.

- **SSID**

  Its length is alterable,but the most length is 32 bytes,and indicates SSID of the target network.

- **PrivacyType**

  Its length is 1 byte,and indicates the encryption type of WLAN module,its definition is as follow.

值	意义
0	No Encrypted
1	WEP
2	WPI
3	CCMP
…	Reserved

- **PrivacyKey**

  Its lengh is 54 bytes,it indicates the privacy key the target network used,according to the difference of encryption types,the definitions of privacy key framework are as follow:

  - WEP

```
typedef struct KEY_WEP{
    INT8U    KeyLength;
    INT8U    KeyIndex;
    INT8U    Groups[4][13];
}KEY_WEP;
```

  - WPI

```
typedef struct KEY_WPI{
    INT8U    Unicast[32];
    INT8U    pad[22];
}KEY_WPI;
```

  - CCMP

```
typedef struct KEY_CCMP{
    INT8U    Unicast[16];
    INT8U    pad[38];
}KEY_CCMP;
```

- **Datatype**

  Its length is 1 byte,it indicates the data format of Link Layer,its effective value

are,0－RAW,1－UDP,2 － TCP.

- **Port**

Its length is 2 bytes,it indicates service port, the order of its bytes uses BigEndian, namely the port number 6000 indicates 0x17，0x70.

- **StaIpAddr**

Its length is 4 bytes,ansd indicates the IP address of WLAN module itself,the order of its bytes uses BigEndian, namely the address 192.168.1.1 indicates 0xC0，0xA8，0x01，0x01.

- **SubnetMask**

Its length is 1 byte,it indicates the subnet mask of the network which WLAN module is in,its effective value is,

0 － no setting

1 － subnet mask 255.255.255.0

2 － subnet mask 255.255.0.0

3 － subnet mask 255.0.0.0

others － reserved

- **SubnetGate**

Its length is 4 bytes,it indicates subnet gate IP address of the network which WLAN module is in,and its format is as above.It needs to note that ,according to the **SubnetMask** value, the value of **SubnetMask** chooses different sffective field,others are ignored.such as

SubnetMask＝1，

SubnetGate[0]＝192

SubnetGate[1]＝168

SubnetGate[2]＝1

SubnetGate[3]＝1

Then ,only **SubnetGate[3]** is effective,others are ignored.

- **SerIpAddr**

  Its length is 4 bytes,it indicates the IP address of data center server,the format is as above.

- **SerMacAddr**

  Its length is 6 bytes,and it indicates the MAC address of data center server(only be used at RAW format).

4.5. Programme Guide

4.5.1. The Example of Network Control

- Example 1

Request is to scan the network which the channel is 1、5、6、11

Create the following order according to the parameters(the part of blue).

```
aa 84 00 04 13 00 31 04 55 00 00 00 00 00 00
```

Return the message of result,

```
aa 0b 01 02 7a 40 01 01 00 1d 60 95 3d e0 04 61
73 75 73 02 01 00 1d 0f 85 8f 74 08 77 65 70 34
30 62 73 73 03 01 00 0b c0 03 06 2d 07 61 70 5f
77 61 70 69 04 01 60 11 22 33 44 02 07 48 45 44
5f 31 32 33 05 06 00 21 27 2a ca d4 04 6d 63 67
73 06 05 00 1a 70 35 b9 30 10 73 74 61 75 61 72
74 5f 77 72 76 5f 6f 70 65 6e 07 05 00 1a 70 35
b9 31 11 73 74 61 75 61 72 74 5f 77 72 76 5f 77
65 70 5f 5f 08 05 00 1a 70 35 b9 32 12 73 74 61
75 61 72 74 5f 77 72 76 5f 77 65 70 31 32 38 09
06 00 1f 33 be 2a c2 0d 4e 45 54 47 45 41 52 2d
32 2e 34 2d 47 0a 06 00 0f 3d 28 9e ff 04 4d 43
47 53 0b 06 00 14 d1 c3 5c bd 05 68 61 6e 6a 70
0c 0b 00 1e 58 a3 01 a2 03 61 62 6a 0d 0b 00 1b
2f 56 df 5e 05 31 32 33 34 35 0e 0b 00 1b 2f 56
0d 50 07 4e 45 54 47 45 41 52 0f 0b 08 10 74 0a
df 46 04 77 68 7a 32 00 00 00 00 00 00
```

The explaination content is,

```
[Info]
==================BSSs===================================
  IDX  Channel  BSSID                 SSID
   1     1      00-1d-60-95-3d-e0     asus
   2     1      00-1d-0f-85-8f-74     wep40bss
   3     1      00-0b-c0-03-06-2d     ap_wapi
   4     1      60-11-22-33-44-02     HED_123
   5     6      00-21-27-2a-ca-d4     mcgs
   6     5      00-1a-70-35-b9-30     stauart_wrv_open
   7     5      00-1a-70-35-b9-31     stauart_wrv_wep__
   8     5      00-1a-70-35-b9-32     stauart_wrv_wep128
   9     6      00-1f-33-be-2a-c2     NETGEAR-2.4-G
  10     6      00-0f-3d-28-9e-ff     MCGS
  11     6      00-14-d1-c3-5c-bd     hanjp
  12    11      00-1e-58-a3-01-a2     abj
  13    11      00-1b-2f-56-df-5e     12345
  14    11      00-1b-2f-56-0d-50     NETGEAR
  15    11      08-10-74-0a-df-46     whz2
============================================================
```

➢ Example 2

Request is to connect to the target network which the first group of parameters set.

Create the following order according to the parameters(the part of blue).

```
aa 85 00 03 b6 01 01 fc 00 00 00 00 00 00
```

Return the message of successful connection,

```
aa 0c 00 1c 92 41 00 05 00 1a 70 35 b9 32 12 73
74 61 75 61 72 74 5f 77 72 76 5f 77 65 70 31 32
38 00 00 00 00 00 00
```

The explaination content is,

Connect successfully

Channel：5

BSSID：00-1a-70-35-b9-32

SSID：stauart_wrv_wep128

4.5.2. The Example of Parameters Setting

➢ Example 1

Request is to set the first group of network parameters as follow:

BSSID：00-1a-70-35-b9-32

Channel：5

SSID：stauart_wrv_wep128

Encryption type：WEP

Privacy key：128 bits、choose the second group of privacy keys,the keys are 0x30,0x30, 0x30,0x30, 0x30,0x30, 0x30,0x30, 0x30,0x30, 0x30,0x30,0x30

Create the following order according to the parameters(the part of blue).

```
aa 83 00 76 d7 03 b1 01 06 00 1a 70 35 b9 32 02
01 05 03 21 73 74 61 75 61 72 74 5f 77 72 76 5f
77 65 70 31 32 38 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 04 01 01 05 40 0d 01 00 00 00 00
00 00 00 00 00 00 00 00 00 30 30 30 30 30 30 30
30 30 30 30 30 30 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 e1 00 00 00 00 00
00
```

4.5.3. The example of sending data

- Example 1

Request is to send the following data to WLAN module with send /response mode:

This is a test text with ack.

Create the following data frame according to the request.

```
aa 9d 00 1e fd 54 68 69 73 20 69 73 20 61 20 74
65 73 74 20 74 65 78 74 20 77 69 74 68 20 61 63
6b 2e 6e 00 00 00 00 00 00
```

- Example 2

Request is to send the following data to WLAN module with continuous sending:.

This is a test text without ack.

Create the following data frame according to the request.

```
aa 1c 00 20 35 54 68 69 73 20 69 73 20 61 20 74
65 73 74 20 74 65 78 74 20 77 69 74 68 6f 75 74
20 61 63 6b 2e 00 00 00 00 00 00
```

4.5.4. CRC-8 Algorithm Reference Implementation

```
INT8U __crc8_tbl[256]=
{
    0x00,0x91,0xe3,0x72,0x07,0x96,0xe4,0x75,
    0x0e,0x9f,0xed,0x7c,0x09,0x98,0xea,0x7b,
    0x1c,0x8d,0xff,0x6e,0x1b,0x8a,0xf8,0x69,
    0x12,0x83,0xf1,0x60,0x15,0x84,0xf6,0x67,
    0x38,0xa9,0xdb,0x4a,0x3f,0xae,0xdc,0x4d,
    0x36,0xa7,0xd5,0x44,0x31,0xa0,0xd2,0x43,
    0x24,0xb5,0xc7,0x56,0x23,0xb2,0xc0,0x51,
    0x2a,0xbb,0xc9,0x58,0x2d,0xbc,0xce,0x5f,
    0x70,0xe1,0x93,0x02,0x77,0xe6,0x94,0x05,
    0x7e,0xef,0x9d,0x0c,0x79,0xe8,0x9a,0x0b,
    0x6c,0xfd,0x8f,0x1e,0x6b,0xfa,0x88,0x19,
    0x62,0xf3,0x81,0x10,0x65,0xf4,0x86,0x17,
    0x48,0xd9,0xab,0x3a,0x4f,0xde,0xac,0x3d,
    0x46,0xd7,0xa5,0x34,0x41,0xd0,0xa2,0x33,
    0x54,0xc5,0xb7,0x26,0x53,0xc2,0xb0,0x21,
    0x5a,0xcb,0xb9,0x28,0x5d,0xcc,0xbe,0x2f,
    0xe0,0x71,0x03,0x92,0xe7,0x76,0x04,0x95,
    0xee,0x7f,0x0d,0x9c,0xe9,0x78,0x0a,0x9b,
    0xfc,0x6d,0x1f,0x8e,0xfb,0x6a,0x18,0x89,
    0xf2,0x63,0x11,0x80,0xf5,0x64,0x16,0x87,
    0xd8,0x49,0x3b,0xaa,0xdf,0x4e,0x3c,0xad,
    0xd6,0x47,0x35,0xa4,0xd1,0x40,0x32,0xa3,
    0xc4,0x55,0x27,0xb6,0xc3,0x52,0x20,0xb1,
    0xca,0x5b,0x29,0xb8,0xcd,0x5c,0x2e,0xbf,
    0x90,0x01,0x73,0xe2,0x97,0x06,0x74,0xe5,
    0x9e,0x0f,0x7d,0xec,0x99,0x08,0x7a,0xeb,
    0x8c,0x1d,0x6f,0xfe,0x8b,0x1a,0x68,0xf9,
    0x82,0x13,0x61,0xf0,0x85,0x14,0x66,0xf7,
    0xa8,0x39,0x4b,0xda,0xaf,0x3e,0x4c,0xdd,
    0xa6,0x37,0x45,0xd4,0xa1,0x30,0x42,0xd3,
    0xb4,0x25,0x57,0xc6,0xb3,0x22,0x50,0xc1,
    0xba,0x2b,0x59,0xc8,0xbd,0x2c,0x5e,0xcf
};

INT32S ChkCrc8(INT8U *ptr, INT32U len)
{
    INT8U crc8,data;
    crc8=0;
```

```
    while(len--!=0)
    {
        data = *ptr++;
       crc8=__crc8_tbl[crc8^data];
    }
    if(crc8==0x00)
      return 0;
    else
      return -1;
}

INT8U GetCrc8(INT8U *ptr, INT32U len)
{
    INT8U crc8,data;
    crc8=0;
    while(len--!=0)
    {
        data = *ptr++;
        crc8=__crc8_tbl[crc8^data];
    }
    return crc8;
}
```

4.6. Modification Note of Serial Protocol

- Version 1.3 modifies as follow based on version 1.0

1、The most length of LENGTH field in data format definition of UART serial protocol modifies to 1400;

2、Data format definition of user serial protocol is increased TCP failed sending message;

3、The definition of the IDX parameter which is the start connection order is modified to the index number of network parameters group;

4、parameter setting order/parameter inquiry order/parameter inquiry message of user serial protocol is increased PB field;

5、Parameter ID value M field expresses in parameter setting order/parameter inquiry

order/parameter inquiry message of user serial protocol is afresh defined.

6、The initialization completion message of user serial protocol is increased the definition of TYP, V and INFO field;

- Version 1.4 modifies as follow based on version 1.3

1、Data format definition of user serial protocol is increased TCP connection order/status message;

2、System parameter setting is increased the TcpServerMode parameter;

- Version 1.5 modifies as follow based on version 1.4

1、Network parameters configuration is increased the subnet mask and subnet gate parameters;

2、The length of the wireless privacy key in network parameter is changed to 54 bytes from 64 bytes.

3、Beginning from Version 1.53,IDX parameter in the message of scanning network result is modified to the denotation of network signal intension.